

**What is claimed is:**

1. 1. A hybrid device comprising:
  2. a sensor having a permanent magnet adjacent to a permeable pole piece and a sensor coil coupled to the pole piece providing a sensor output;
  3. a target for interacting with the sensor;
  4. an excitation means for energizing the sensor coil;
  5. and
  6. an output signal detector connected to the excitation means.
1. 2. The hybrid device according to claim 1 wherein the permeable pole piece is fabricated as a cylinder, the permeable pole piece having a concentric axis.
1. 3. The hybrid device according to claim 2 wherein the sensor coil is a spiral coil surrounding the permeable pole piece along the concentric axis of the permeable pole piece.
1. 4. The hybrid device according to claim 1 wherein the excitation means is an inductive bridge.
1. 5. The hybrid device according to claim 4 further comprising: a temperature compensation coil coupled across the inductive bridge.
1. 6. The hybrid device according to claim 1 wherein the excitation apparatus is a Colpitts Oscillator.
1. 7. The hybrid device according to claim 1 wherein the output signal detector correlates the sensor output to a target surface velocity.

1 8. The hybrid device according to claim 1 wherein the output  
2 signal detector correlates a sensor output to  
3 proximity between the target and the sensor.

1 9. The hybrid device according to claim 1 wherein the  
2 permeable pole piece is fabricated as a hollow  
3 cylinder having a concentric axis.

1 10. The hybrid device according to claim 9 wherein the  
2 sensor coil is a spiral coil within the permeable  
3 pole piece, the spiral coil is wound along the  
4 concentric axis of the permeable pole piece.

1 11. The hybrid device according to claim 9 wherein the  
2 permeable pole piece is fabricated as a caliper, the  
3 permeable pole piece having a concentric axis.

1 12. A hybrid device comprising:  
2 a sensor having a permeable pole piece with a sensor  
3 coil coupled to the permeable pole piece;  
4 a target having at least one permanent magnet for  
5 interacting with the sensor;  
6 an excitation apparatus connected to the sensor  
7 coil; and  
8 an output signal detector connected to the  
9 excitation apparatus for determining sensor  
10 output.

1 13. The hybrid device according to claim 12 wherein the  
2 permeable pole piece is fabricated as a cylinder,  
3 the permeable pole piece having a concentric axis.

1 14. The hybrid device according to claim 12 wherein the  
2 sensor coil is a spiral coil surrounding the  
3 permeable pole piece along the concentric axis of  
4 the permeable pole piece.

1 15. The hybrid device according to claim 12 wherein the  
2 excitation means is an inductive bridge.

1 16. The hybrid device according to claim 14 further  
2 comprising:

3 a temperature compensation coil coupled across the  
4 inductive bridge.

1 17. The hybrid device according to claim 12 wherein the  
2 excitation apparatus is a Colpitts Oscillator.

1 18. The hybrid device according to claim 12 wherein the  
2 output signal detector correlates the sensor output  
3 to the velocity of the at least one permanent  
4 magnet.

1 19. The hybrid device according to claim 12 wherein the  
2 output signal detector correlates a sensor output to  
3 proximity between the at least one permanent magnet  
4 and the sensor.

1 20. The hybrid device according to claim 12 wherein the  
2 permeable pole piece is fabricated as a hollow  
3 cylinder having a concentric axis.

1 21. The hybrid device according to claim 20 wherein the  
2 sensor coil is a spiral coil within the permeable

3                   pole piece, the spiral coil is wound along the  
4                   concentric axis of the permeable pole piece.

1   22.   The hybrid device according to claim 12 wherein the  
2                   permeable pole piece is fabricated as a caliper, the  
3                   permeable pole piece having a concentric axis.

1   23.   The hybrid device comprising:  
2                   a sensor having a permanent magnet adjacent to a  
3                   permeable pole piece and a sensor coil coupled  
4                   to the pole piece, the permeable pole piece is  
5                   fabricated as a cylinder, the permeable pole  
6                   piece having a concentric axis, the sensor coil  
7                   is a spiral coil surrounding the permeable pole  
8                   piece along the concentric axis of the  
9                   permeable pole piece;  
10                  a target for interacting with the sensor;  
11                  an excitation apparatus connected to the sensor  
12                  coil, the excitation apparatus is an inductive  
13                  bridge;  
14                  a temperature compensation coil is coupled across  
15                  the inductive bridge; and  
16                  an output signal detector connected to the  
17                  excitation apparatus for determining sensor  
18                  output, the output signal detector correlates  
19                  the sensor output to a target surface velocity  
20                  measurement.